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GEOLOGICAL SURVEY BRANCH ASSESSMENT REPORTS

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24,055 VANCOUVER, B.C.

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6.

RECOMMENDATIONS

FILMED

BOSTON INDUSTRIES CORP

Bingo Mineral Claims Shawnigan Lake Area Vancouver Island

1. **INTRODUCTION**

A limited geophysical resistivity survey was conducted over the east end of Bingo 1 claim, to be applied for assessment credit for Bingo 1 and Bingo 2 mineral claims. The work was done by V. Cukor, P. Eng. and D. Cukor, geologist.

The extent of survey was limited by availability of exploration funds, and only 7 kilometres of gridlines were surveyed. The original grid, cut in 1987, was used in the survey, but most of stations had to be reflagged and locally the lines had to be recHaimed since the portion of the flaggings had weathered, with the markings either faded or washed off, or the flagging had completely disappeared.

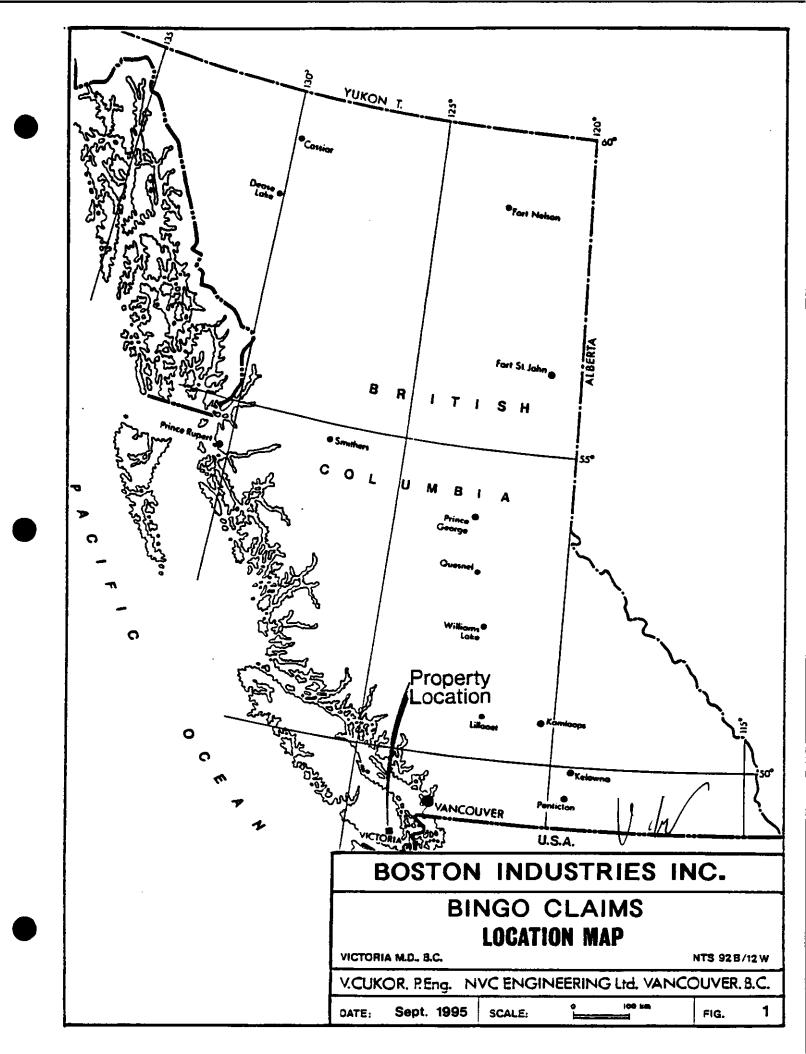
2. PROPERTY, LOCATION and ACCESS

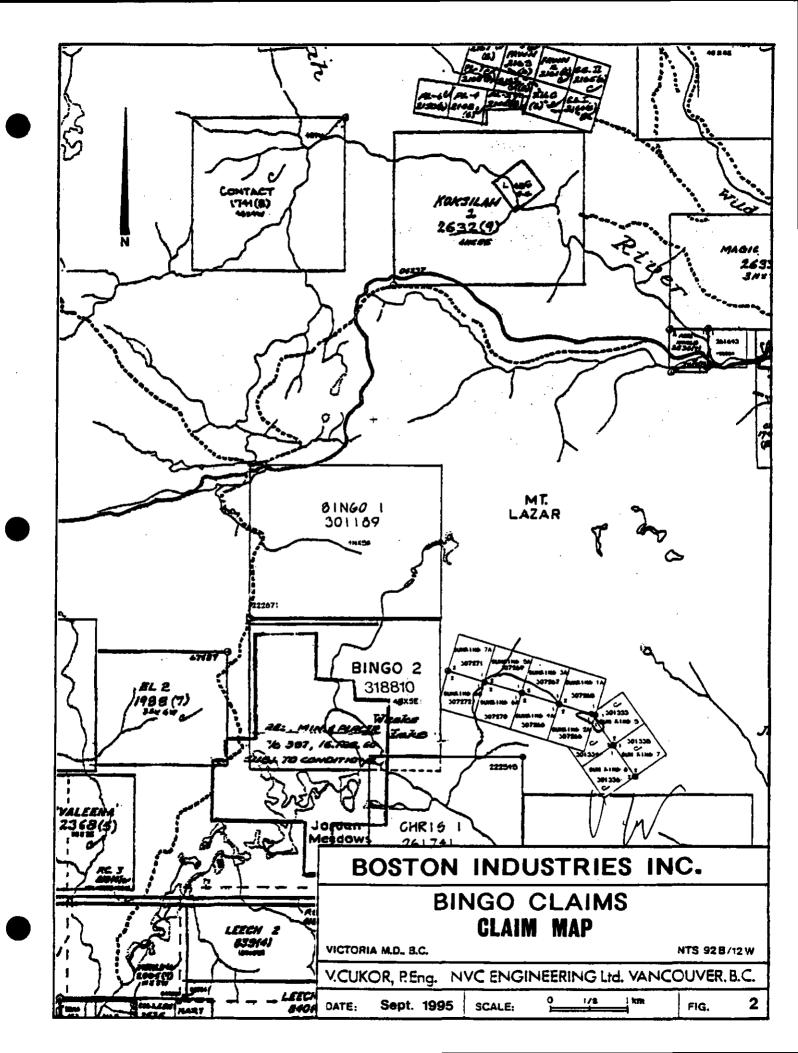
The property consists of two contiguous claims, staked on the modified grid system. The claim names and respective recording data are as follows:

Claim Name	No. Units	Record No.	Anniversary Date
BINGO 1	20	301189	June 28, 1996
BINGO 2	20	318810	June 23, 1996

The property is located about 15 km. west of Shawnigan Lake in the southern part of Vancouver Island, about 40 km. northwest of Victoria, B.C. It is in the Victoria Mining Division, on NTS 92B/12W. The claim group is centred at approximate latitude 48° 36' and west longitude 123° 50' (see figures 1 and 2).

The access to the claims area is provided by an all weather gravel road from Shawnigan Lake.. The main logging road follows the western border of the claims, from where a number of abandoned secondary logging roads, mostly passable by 4x4 vehicle, provide access to different parts of the claims.





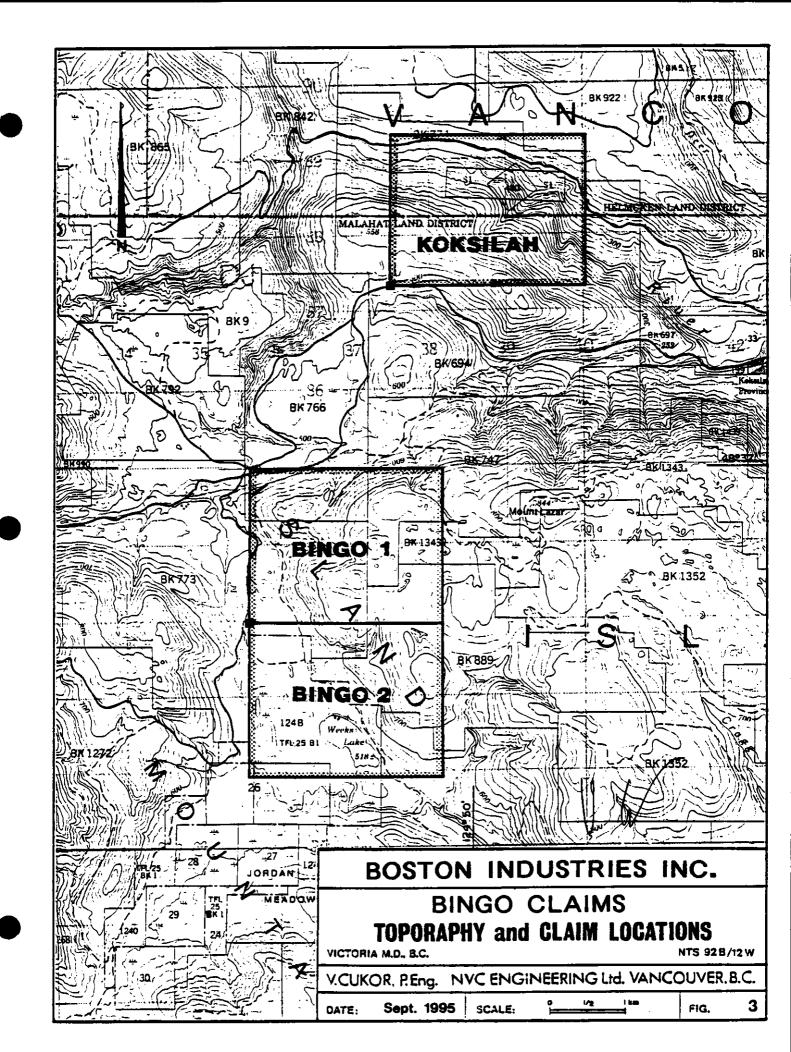
3. TOPOGRAPHY and CLIMATE

The Bingo 1 and Bingo 2 claims are located on the peaks to the west of Mt. Lazar, on its southwest slopes and in the Weeks Lake Valley. Elevations are between 520 metres and 820 metres above sea level, for a total relief of 300 meters. The topography is varied; virtually flat in the valley and on the plateau on top of the hill. The side hill is moderately steep, transected by deeply carved and steep sided gullies.

The vegetation on the claims is second growth timber. The regenerating forest is thickest and tallest in the valley with the trees up to 10 metres in height. On the hilltop, the trees are 1.5 metres in height on average. Old logging slash covers most of the property, making linecutting difficult and time consuming.

Climate of the property area is fairly typical for the West Coast. The summers are usually hot and relatively dry. Atmospheric precipitation is high in the other seasons. Winters are cool to moderately cold with variable amounts of snowfall year to year. The tops of the hills, made bare by logging, are subject to fairly high winds during winter storms. The generally moderate climate and high precipitation are conducive to fast vegetation growth.

Timber and water for exploration purposes is available on the property.



4. **GEOLOGY**

4.1 Regional Geology

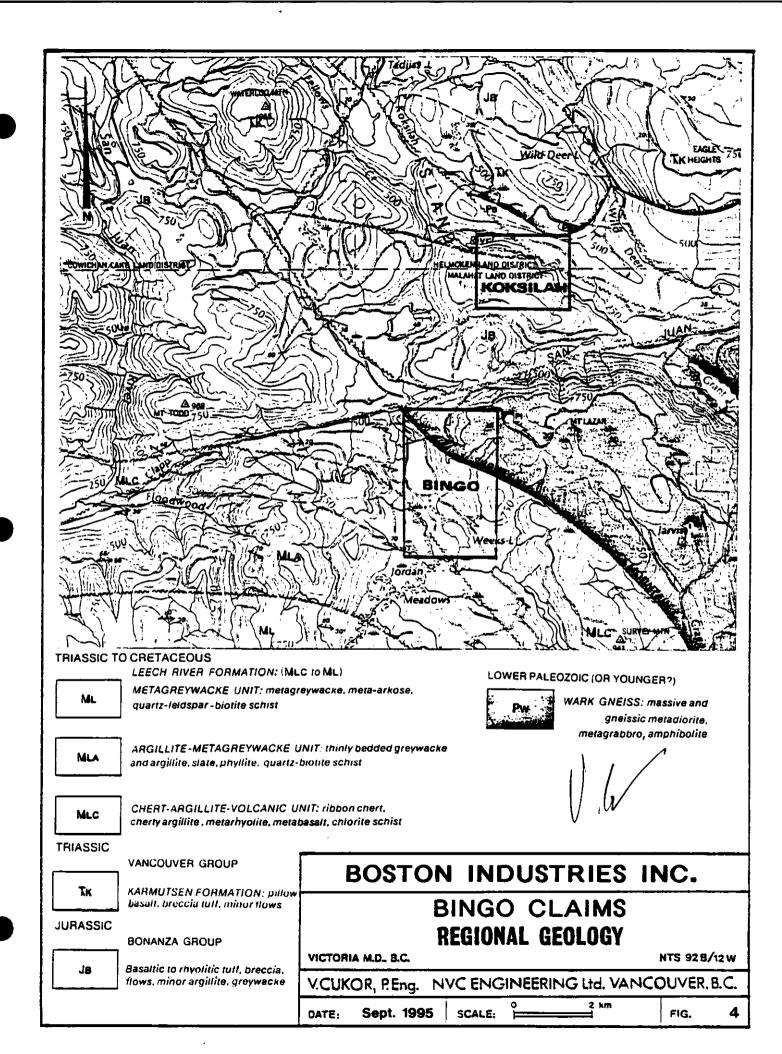
General geological features of the area are shown on the geology map entitled "Geology, Victoria Map Area", Open File 701, by J.E. Muller, scale 1:100,000.

Two major fault zones dominate the area, the east-west San Juan Fault and the northwest-southeast Survey Mountain Fault. These are major structural features, separating geological regions in the area (the Survey Mountain Fault separates the Inner Pacific and Insular Geological Belts.

As shown on fig.4, the area is underlain by geological units from Paleozoic to Upper Cretaceous ages.

4.2 **Property Geology**

Two main rock assemblages are represented on the claim group: chloritized diorite and gneissic diorite of the Wark Gneissic Complex and the metasediments and volcanics of the Leech River Formation. Diotites outcrop at the northern and northeastern portion of the claims, while the Leech Fiver Complex covers the rest of the area. They are separated by the Survey Mountain Fault Zone, the main cause of fracturing, and a host for silicification and pyritization on the area which is striking in WNW - ESE direction in the Bingo 1 area. This wide fault zone was found to host spotty gold values and is a fair exploration target.



5. **GEOPHYSICAL SURVEY**

5.1 Field Method

The instrument used for the survey was the Scrintex IGS-2. Only a portion of the large grid was surveyed as an extension of the 1993 program. With completion of this year survey the entire grid, north of the baseline is now surveyed with resistivity method.

A total of 7 km of survey were run on 100m spaced lines at 25m station intervals. A two man crew carried out the field work over the grid lines cut in 1987. Since some flagging along the lines was broken off by wind or animals, and most of the markings on the flagging were faded, the field helper chained lines and remarked stations for the engineer. The helper would first assist the engineer by setting up the resistivity pots for taking the readings and then proceed to chain along the line to the next station. Locally, steep terrain and / or dense second growth made survey very difficult and time consuming.

The instrument used, a Scintrex IGS-2 can be set up to perform magnetic, VLF-EM and resistivity surveys. Since the magnetic and VLF-EM surveys were completed as a part of the 1987 program, only the resistivity survey was carried out now.

For the resistivity survey, the IGS-2 makes measurements of the VLF electric field, utilizing a dipole with an electrode spacing of five meters. The instrument then automatically calculates apparent resistivity from the in-phase and quadrature components of the horizontal electric field, using the horizontal magnetic field as a phase reference. See Appendix B for the apparent resistivity calculation.

For this survey, signals from the VLF station Seattle, 24.8 kHz were used.

5.2 Data Presentation and Discussion of Results

All survey results are shown on the Resistivity Survey Plan (figure 5), presented in a scale of 1:5000. Values, expressed in ohmmeters, were plotted on this grid map and then the map was contoured. The plan also shows the contour lives of the 1993 survey, to make it easier to correlate the results between these two surveys.

The total range of values of this portion of the survey was 4204 ohmmeters; a high of 4220 and a low of 16 ohmmeters was recorded. This is high relief, although the 1990 survey was characterised by considerably higher relief of 7395 ohmmeters.

A distribution of the high-low values on the contoured survey plan significantly coincides with the pattern of identified geological units and structural elements shown on the geological map. It also in general coincides with the position and trends of zones of high and/or low readings on the previous surveys. In detail, however, the readings in the area bordering two surveys, do not match.

6. **RECOMMENDATIONS**

September 15, 1995

The resistivity survey appears to be a very effective tool in this instance. The zones of high readings and low readings clearly coincide with a position of geological units earlier identified. Zones of very low readings are coincidental with the location and trend of the zone of intense fracturing and alteration within a major fault system. In the area of extensive overburden cover, this method should assist in detail geological mapping and planning of physical exploration. Thus it is recommended to extend the survey over the whole grid area. Very detailed geological mapping and extensive rock sampling should be also carried out without the zone of interest.

Respectfully submitted

V. Cukor, P. Eng

NVC ENGINEERING LTD.

CERTIFICATE

I, VLADIMIR CUKOR, of 21651 Mountain View Crescent in the Municipality of Maple Ridge, Province of British Columbia, DO HEREBY CERTIFY that:

- 1. I am a Consulting Geological Engineer with NVC Engineering Ltd., with business address as above;
- 2. I graduated from the University of Zagreb, Yugoslavia in 1963 as a Graduated Geological Engineer;
- I am a Registered Professional Engineer in the Geological Section of the Association of Professional Engineers in the Province of British Columbia, Registration No. 7444;
- 4. I have practiced my profession as a Geological Engineer for the past thirtytwo years in Europe, North America and South America in engineering geology, hydrogeology and exploration for base metals and precious metals.
- 5. I have personally conducted the work described in this Report and reviewed all available information on the property.

V. Cukor, P. Eng.

NVC ENGINEERING LTD.

APPENDIX A

COSTS OF THE PROGRAM and PERSONNEL INVOLVED

Field Work

Grid Rehabilitation 7 km @ \$ 250	\$ 1,750.00
Geophysical Survey 7km @ \$ 500	3,500.00

Report

Preparing Report Drafting and Typing	850.00
Troputing resport Diatring and Typing	_050.00

Total Costs \$ 6,100.00

Personnel:

V. Cukor, P. Eng.

D. Cukor, geologist

V. Cukor, P.Eng

APPENDIX B

INSTRUMENT SPECIFICATIONS

1. THE IGS-2 SYSTEM

1.1 General Information

The IGS-2 Integrated Geophysical System is a portable microprocessor-based instrument which allows more than one type of survey measurement to be performed by a single operator during a survey.

The IGS-2 is a modular system which can easily be configured to suit different and changing survey requirements. Reconfiguring the system is easy and offers both operational flexibility and minimal redundancy with a minimum number of spare consoles and/or modules.

When configured with any of the available senor options, the IGS-2 System Control Console becomes a method-specific instrument according to the senor option(s) utilized. In addition, the IGS-2 Console is an electronic notebook into which geophysical, geological or other data may be manually entered and digitally stored.

Data is stored in the IGS-2 in an expandable, solid state memory and can be output in the field by connecting the instrument to a printer, tape recorder, modem or microcomputer.

The 32 character digital display uses full words in most cases, ensuring clear communication. Both present and previous data are displayed simultaneously, allowing comparisons to be made at a glance during a survey.

The IGS-2 records header information, data values, station number, line number, grid number and the time of each observation in its internal memory. Data are first sorted by grid number, then in order of increasing line number and, within each line, by increasing station number. In this way, the data are organized logically regardless of the sequence in which they were taken. Ancillary data can also be manually entered and recorded at a given station, along with the survey parameters.

1.2 Standard Console Specifications

Digital Display	32 character, 2 line LCD display
Keyboard Input	14 keys for entering all commands, coordinates, header and ancillary information
Languages	English plus French is standard
Standard Memory	lok RAM. More than sufficient for a day's data in most applications
Clock	Real time clock with day, month, year, hour, minute and second. One second resolution, ± 1 second stability over 12 hours. Needs keyboard initialization only after battery replacement
Digital Data Output	RS-232C serial interface for digital printer, modem, microcomputer or cassette tape recorder. Data outputs in 7 bit ASCII, no parity format. Baud rate is keyboard selectable at 110, 300, 600 and 1200 baud. Carriage return delay is keyboard selectable in increments of one from 0 through 999. Handshaking is done through X-ON/X-OFF protocol. Allows IGS-2 to act as a master for other instrumentation.

<u> </u>	
Analog Output	For a strip chart recorder. 0 to 999 mV full scale with keyboard selectable sensitivities of 10, 100 or 1000 units full scale.
Console Dimensions	240 x 90 x 240 mm includes mounted battery pack.
Weights	Console; 2.2 kg. Console with Non- rechargeable Battery Pack; 3.2 kg. Console with Rechargeable Battery Pack; 3.6 kg.
Operating Temperature Range	-40°C to +50°C provided optional Display Heater is used below -20°C.
Power Requirements	Can be powered by external 12 V DC or one of the Battery Pack Options listed below.

2. IGS-2/MP MAGNETOMETER

2.1 The Magnetic Method

The magnetic method consists of measuring the magnetic field of the earth as influenced by rock formations having different magnetic properties and configurations. The measured field is the vector sum of induced and remanent magnetic effects. Thus, there are three factors, excluding geometrical factors, which determine the magnetic field. These are the strength of the earth's magnetic field, the magnetic susceptibilities of the rocks present and their remanent magnetism.

The earth's magnetic field is similar in form to that of a bar magnet's. The flux lines of the geomagnetic field are vertical at the north and south magnetic poles where the strength is approximately 60,000 nT. In the equatorial region, the field is horizontal and its strength is approximately 30,000 nT.

The primary geomagnetic field is, for the purposes of normal mineral exploration surveys, constant in space and time. Magnetic field measurements may, however, vary considerably due to short term external magnetic influences. The magnitude of these variations is unpredictable. In the case of sudden magnetic storms, it may reach several hundred gammas over a few minutes. It may be necessary, therefore, to take continuous readings of geomagnetic field with a base station magnetometer while the magnetic survey is being done. alternative field procedure is to make periodic repeat measurements at convenient traverse points, although this is a very unreliable method during active magnetic storms when it is important to have proper reference data.

The intensity of magnetization induced in rocks by the geomagnetic field F is given by:

I = kF

where I is the induced magnetization k is the volume magnetic susceptibility F is the strength of the geomagnetic field

For most materials, k is very much less than 1. If k is negative, the body is said to be diamagnetic. Examples are quartz, marble, graphite and rock salt. If k is a small positive value, the body is said to be paramagnetic, examples of which are gneiss (k =

0.002), pegmatite, dolomite and syenite. If k is a large positive value, the body is strongly magnetic and it is said to be ferromagnetic, for example, magnetite (k = 0.3), ilmenite and pyrrhotite.

The susceptibilities of rocks are determined primarily by their magnetite content since this mineral is so strongly magnetic and so widely distributed in the various rock types. (Of considerable importance, as well, is the pyrrhotite content.)

The remanent magnetization of rocks depends both on their composition and their previous history. Whereas the induced magnetization is nearly always parallel to the direction of the geomagnetic field, the natural remanent magnetization may bear no relation to the present direction and intensity of the earth's field. The remanent magnetization is related to the direction of the earth's field at the time the rocks were last magnetized. Movement of the body through folding, etc., and the chemical history since the previous magnetization are additional factors which affect the magnitude and direction of the remanent magnetic vector.

Thus, the resultant magnetization M of a rock is given by:

$$M - M_n + kF$$

where M is the natural remanent magnetization, and F is a vector which can be completely specified by its horizontal (H) and vertical (Z) components and by the declination (D) from true north. Similarly, M is specified when its magnitude and direction are known. Thus, considerable simplification results if M = 0, whereupon M merely reduces to kF. In the early days of magnetic prospecting, it was usually assumed that there was no remanent magnetization. However, it has now been established that both igneous and sedimentary rocks possess remanent magnetization, and that the phenomenon is a widespread one.

2.2 Magnetometer Specifications

Total Field Operating Range 20,000 to 100,000 nT (1 nT = 1 gamma)

Gradient Tolerance For ±5000 nT/m
Total Field

Total Field Absolute Accuracy	<pre>±1 nT at 50,000 nT ±2 nT over total field operating and temperature range.</pre>
Resolution	0.1 nT
Tuning	Fully solid-state. Manual or automatic mode is keyboard selectable.
Reading Time	2 seconds. For portable readings this is the time taken from the push of a button to the display of the measured value.
Continuous Cycle Times	Keyboard selectable in I second incre- ments upwards from 2 seconds to 999 seconds.

3. IGS/VLF-4 ELECTROMAGNETIC RECEIVER

3.1 VLF Theory

VLF stations (total of 12 stations located around the world) radiate electromagnetic waves on the VLF band in the range between 15 to 29 kHz. The signals are transmitted for purposes of navigation and ommunication with submarines. The VLF Electromagnetic Receiver picks up the magnetic and electric fields of these signals to provide information about the electrical properties of the earth.

The signal transmitted by the VLF station is recorded by the vertical coils as:

$$H_p = A \sin w ; H_s = B \cos (w - s)$$
 (1.0)

where $H_p = primary signal$

A = amplitude of primary signal

 H_q = secondary (phase laged) signal

B = amplitude of secondary signal

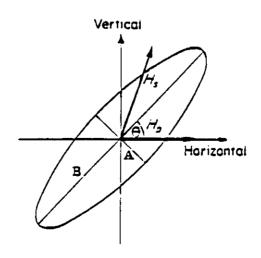
w = frequency

t = time

ø = phase lag

These two received signals combine giving an ellipse (see fig. A), which two axis correspond to the length and width of the ellipse.

i.e.
$$\frac{H_{p}^{2}}{A^{2}} + \frac{H_{s}^{2}}{B^{2}} - \frac{2 H_{p} H_{s} \sin \alpha}{AB} = \cos^{2} \alpha$$



By measuring the angle from the horizontal to the longaxis of the ellipse (θ) , a conductor is located when this tilt angle is zero.

As its primary measurement, the IGS-2/VLF-4 employs two mutually orthogonal receive coils to determine three parameters of the VLF magnetic field. 1) the horizontal amplitude vector in a joining the direction perpendicular to a line operator to the station: 2) the amplitude of the component of the vertical field vector which is in phase with the horizontal vector: and 3) the amplitude of the component of the vertical field vector which is 90° out of phase with the horizontal vector. These three parameters, for the given VLF transmitter, are recorded simultaneously. Since the vertical components are expressed as a percentage of the horizontal vector, they are automatically normalized for any changes in the amplitude of the transmitted primary field.

The primary field from a VLF station can, in fact, vary considerably. For the most part, the field fluctuates moderately during the course of the day due to changes in atmospheric conditions. are. however, more dramatic changes. Towards evening there is a large upwards swing in the field strength, and at several points during the day, both partial and total drops in the field amplitude can be observed. In the light of these irregularities. the horizontal field data should alwavs considered with reservation as it is difficult to know whether changes are caused by conductors or by variations in the station's signal.

If the primary field strength is constant, changes in the amplitude of the horizontal magnetic field mainly reflect variations in the conductivity of the earth. Normally, there will be no vertical magnetic field. However, near a conductor, a vertical field will be observed. The relative amplitudes of the in-phase and quadrature components may be used to interpret the conductivity-size characteristics of the conductor.

3.2 IGS/VLF-4 Specifications

Frequency Tuning

Automatic digital tuning. Can be tuned to any frequency in the range 15.0 to 29.0 kHz with a bandwidth of 150 kHz.

Up to three frequencies can be chosen by key-board entry for sequential measurements.

Field Strength Range	Fields as low as 100 mA/m can be received. In practice, background noise may require fields up to 5-10 times this level. Maximum received field is 2 mA/metre. These values are specified for 20 kHz. For any other frequency, calculate the above limits by multiplying by the station frequency in kHz and dividing by 20.
Signal Filtering	Narrow bandpass, low pass and sharp cut-off high pass filters.
Measuring Time	0.5 seconds sample interval. As many as 216 samples can be stacked to improve measurement accuracy.
VLF-Magnetic Field Components Measured	1) Horizontal amplitude, 2) vertical in-phase component, and 3) vertical quadrature components. Vertical components are displayed as a percentage of horizontal component and are related in phase to the horizontal component. Their range is ±120%; reading resolution 1%.
VLF-Magnetic Field Sensor	Two air-cored coils in a backpack mounted housing with an electronic level for automatic tilt compensation. The error in the vertical in-phase component is less than 1% for tilts up to ±15°.

3.3 Fraser Filtering

This technique for filtering VLF-EM data was proposed by Dr. D. C. Fraser in 1969. The reason for applying this filter is that there is a dynamic range problem when presenting the data as profiles. In the same area that a 5° peak to peak anomaly may be significant, anomalies of 100° may also occur. This filtering operation transforms the zero crossovers into peaks and noise is reduced by application of a low-pass filter. The data may be presented as profiles or the positive values may be contoured.

This filter was originally applied to dip angle data as collected by VLF receivers such as the Radem by Crone Geophysics. It is equally applicable to vertical in-phase and quadrature data.

The filter phase-shifts the data by 90° so that zero cross overs and inflections are transformed into peaks. It removes dc and attenuates long spatial wavelengths to increase resolution of local anomalies.

These requirements are met by the difference operator (R(n+1)-R(n)), where R(n) and R(n+1) are any two consecutive readings.

The filter does not exaggerate the random noise. This is achieved by applying a low-pass operator to the differences as follows:

0.25(R(n+1)-R(n)+0.50(R(n+2)-R(n+1)+0.25(R(n+3)-r(n+2)).

The filtered output is then 0.25(R(n+2)+R(n+3)-R(n)-R(n+1)).

As this filtering process was originally designed to be simple so it could be applied by field personnel with limited facilities, the constant is eliminated.

The plotted function then becomes F(n+1,n+2)=(R(n+2)+R(n+3)-(R(n)+R(n+1)).

The interpretation of filter plots is qualitative. Since the filter retains relative amplitudes, large responses can be equated with large and/or highly conductive zones. Very sharp responses indicate shallow sources, and, conversely, broader anomalies indicate progressively deeper sources. The contouring connects responses from line to line and serves to delineate the trend of conductive zones.

An additional interpretive tool is a pseudo-section of the filter outputs. This is produced by processing a given data profile with filters of various lengths or spans. As the length of the filter increases, responses from increasing depths are successively emphasized. Therefore, if these outputs are arranged on a section such that greater depths correspond to longer filters, then the section should approximately resemble the current pattern in the ground. However, it must be emphasized that this is only an approximation to the section (i.e. pseudo-section). Construction of the section follows a number of steps.

3.4 Resistivity

To permit measurement of the VLF-electric field, a dipole consisting of two cylindrical electrodes and five metres of wire is used. When this dipole is correctly laid out, the IGS-2/VLF-4 measures the inphase and quadrature components of the horizontal electric field in the direction of the line joining the operator and the transmitter station. The phase reference is the horizontal magnetic field.

The IGS-2/VLF-4 uses the magnetic and electric field measurements to automatically calculate the apparent resistivity of the earth as well as the phase angle between the magnetic and electric field components. If the earth is uniform (not layered) within the depth of the VLF measurement, the phase angle between the horizontal magnetic and electric VLF fields will be 45°. A non-uniform earth will give rise to other phase angles.

The following formulae are used for resistivity and phase calculations:

Apparent Resistivity Calculation:

$$\rho = \frac{1}{2 \pi f \mu_0} \left| \frac{E_x}{H_y} \right|^2$$

where:

ρ = apparent resistivity on ohm metres

 $E_x = \text{horizontal electric amplitude, calculated}$ $E_y = (E_y(I)^2 + E_y(Q)^2)1/2$

 H_v = horizontal magnetic amplitude, measured

f - VLF station frequency in Hertz

 μ_{o} = permeability of the ground in Henries/metre, a constant

The resistivity calculation has a range of I to 100,000 ohm metres with a resolution of I ohm metre.

Phase Angle Calculation:

The phase angle ∮ is expressed as:

$$\phi = \text{arc tan } \frac{E_{\chi}(Q)}{E_{\chi}(I)}$$

where:

 $E_{x}(Q)$ = horizontal quadrature VLF electric field

E_x(I) = horizontal in-phase VLF electric field, phase referenced to the horizontal magnetic field, Hy.

The phase angle calculation has a range of -180° to +180° with a resolution of 1°. By definition, the angle is positive when the electrical field leads the magnetic field.

